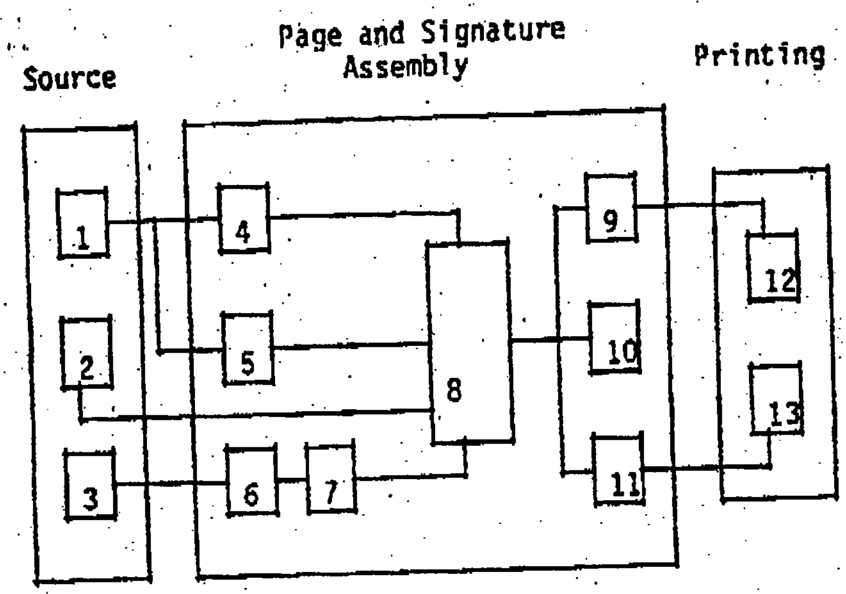
Page Make-up Color

The evolving color page make-up systems are also following the 1980 predictions (Reference 1).

In the 1980 TAGA proceedings, we projected the split-apart scanner and the evolution of many new components for use in optimizing the digital production of process color pages including text. As we move into DRUPA this year, we find many of the components falling into place. Just to review from 1980 (Reference 1), we repeat Figure 15 herein as Figure 10.



1. Original graphics
2. Page layout
3. Text composition
4. Large format drum scanner for pages 11x17"
5. High-speed flatbed scanners for pages 11x17"
6. Digital input of text composition
7. Font library and font generation interactive with No. 8 and providing text in bit map form
8. Page make-up terminal with soft proof
9. Large format output drum scanner, capable of film or intermediate and hard copy proof
10. High-speed flatbed scanner (11x17") for hard copy proofing
11. Digital or other storage media to allow printer to make litho plates in No. 13
12. Conventional platemaking with film
13. Platemaking from output of No. 11 or directly on-line if page make-up is at printers 11x17" flatbed stepping scanner, capable of imposing the elements of the signature on the required size plates.

Figure 10: Components of the Future Commercial Electronic Publishing System

- Screen Resolution: Crosfield is about to begin shipment of their 1024 x 1024 screen which should help in soft color proofing and is part of a basic systems strategy (see later). Scitex has upgraded to 512 x 384 and HCM is at 512 x 512.

- Hardware Assist: Scitex, with its new imager terminal, provides hardware assisted page composition calculations, thereby speeding up tasks such as rotation, sizing, and changing line screens. Crosfield, in its 860 system provides two levels of hardware assistance, one for the display files and an array processor for the page composition calculations. HCM provides hardware assistance for the display files.

- Text: We had previously projected viable text on these systems for 1983 (Reference 1). We continue to hold to that projection. Scitex is acquiring text from Bitstream (a Mergenthaler spin-off). Crosfield has a cooperation with III for text, and HCM already makes typesetters. Look for the beginings of viable text at DRUPA. However, most companies are underestimating the text problem and really viable text (with hyphenation/ justification, kerning, etc. on the system) will be delayed to 1983, or later. Look for a Scitex/Atex interface at DRUPA.

- Viable Archiving: The 6250 bits per inch, high speed tape recorders allow for viable archiving of production work in progress. A full 300 megabyte disk can be copied to tape in approximately 15 minutes (two tapes). HCM, Crosfield and Scitex are committed to this tape recorder.

- New Entrants: In addition to the initial three suppliers, PDI, DS, Eikonix and Coulter Information are at various stages of providing systems. Also look for more entrants on the vendor side.

- Productivity: It is our general conclusion that productivity needs to be improved by a factor of 2 to 4 for these systems to be truly economically viable as "production tools".

Figure 11 delineates the estimated population for these products as of January 1, 1982.

USA/Canada		Worldwide (Estimate)	
Crosfield	13	Crosfield	80 - 90
Scitex	22	Scitex	40 - 50
HCM	8	HCM	20 - 30
Totals:	43 Units	Approx.	165 Units

January 1, 1982

Figure 11: Estimated Population (On Order or Installed)

With this population in the first 2 years of these products, and continued technical progress in the systems as pointed out herein, we continue with our projection of some 300 units installed in the USA by the end of 1987.

Substantially lower pricing (possibly as early as 1985/86) could significantly increase this projection, whereas failure to increase productivity by 2 to 4 times will decrease this forecast.

System strategies of the three current suppliers differ significantly and require potential users to carefully evaluate system performance against actual production jobs to be placed on the system. Careful analysis of which jobs to place on such a system can go a long way toward increasing productivity.

Regarding system strategy, the following is a very brief introduction to the file handling strategy of the three current systems.

Figure 12 is representative of the HCM strategy (to be updated at DRUPA).

Here an input/output station is tied to the CP340 or DC350. Upon input, two files are developed; one being the fine file, which is representative of the

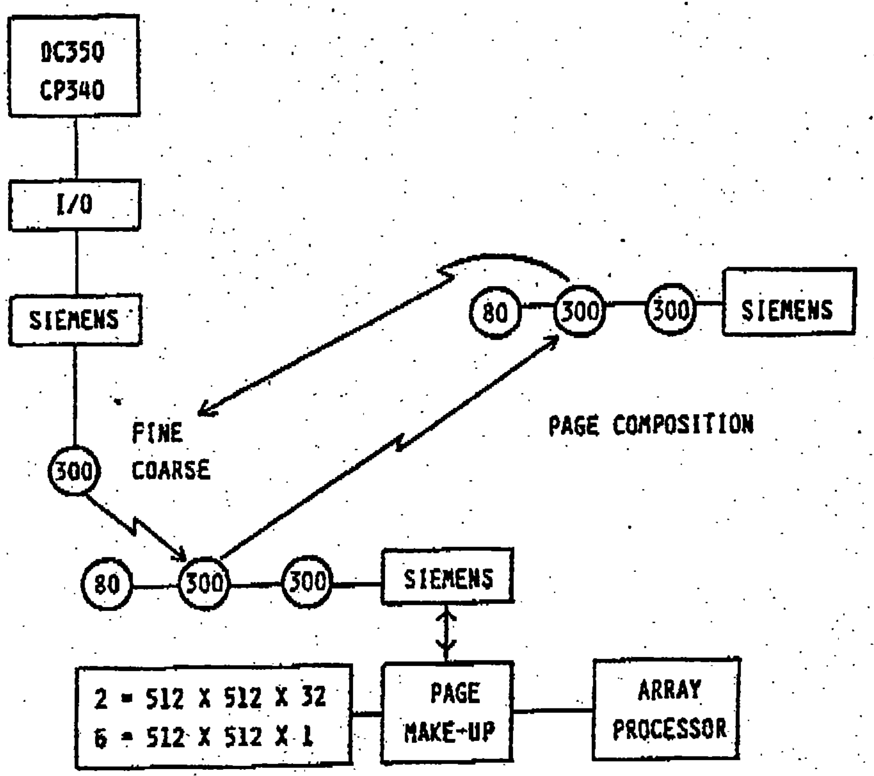


Figure 12: HCM Strategy

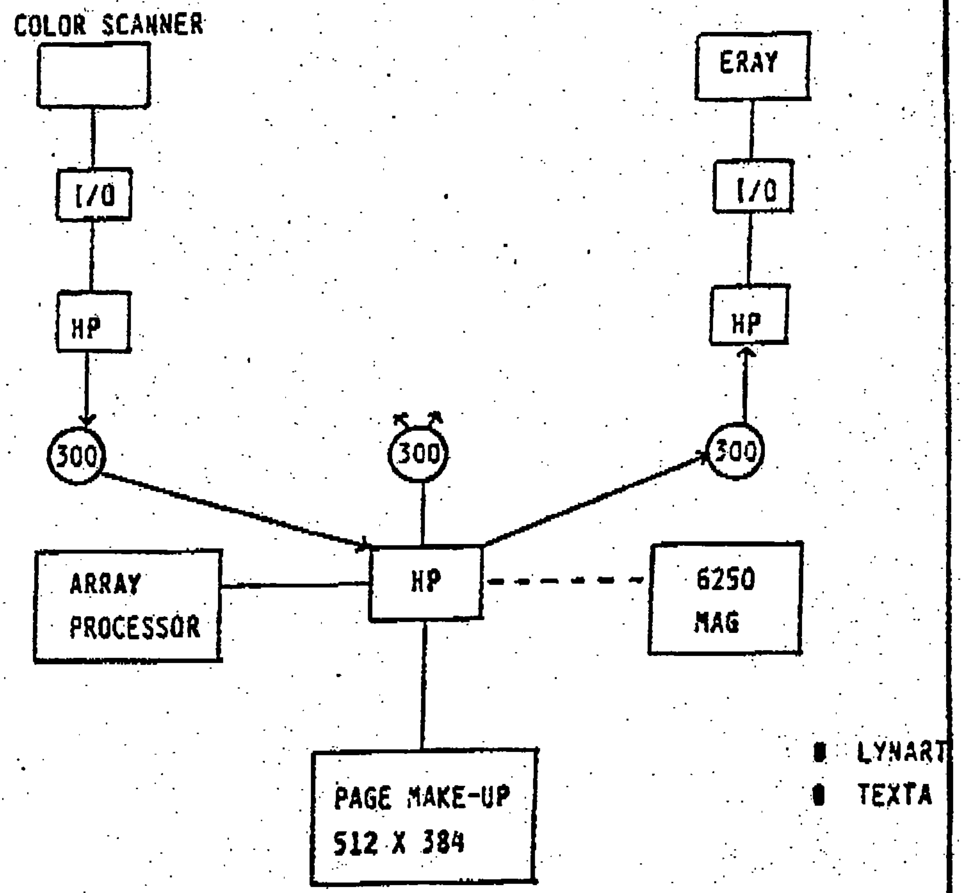
full resolution of the image at output, the other being a view (coarse) file whose resolution (size) is determined by page size parameters. Typically this view file is about 1/50 of the fine file.

The 300 Megabyte pack is then carried to a page make-up terminal where the view file is used for stripping, page composition, rotation, etc. When outline, color correction, silhouetting functions are used, the fine file is accessed, manipulated and when the desired effects have been achieved, the fine file is recalculated. The acquisition of the fine file for display work and the recalculation of the fine file; both slow down the productivity of the color terminal; HCM has improvements on the way.

When the page(s) is(are) completed, the pack is then carried to the page composition computer where all the remaining calculations to compose the page are carried out. This time can vary from 20 minutes to over 1-1/2 hours, depending on the complexity of the job, number of rotations, etc. After this activity, the pack is carried back to the input/output station for final plotting.

Figure 13 provides a general schematic for the Scitex system. Here, there is an input station, output station, and page make-up station. The Scitex 300 megabyte disk drives are dual ported to allow for access of data on any drive by two computers. This facilitates redundancy, foreground/background use of the computers to archive to tape and to do page composition calculations while the three main computers are servicing their main functions.

On input, Scitex only accesses and stores a fine file. When view files are needed for the display, they are recalculated for each acquisition by the display terminal.



COMPUTER TIE IN FOR
- REDUNDANCY
- OPTIMIZING USE

ONE PAGE MAKE-UP PER COMPUTER

Figure 13: Scitex Strategy

As with HCM, certain functions are performed on the fine file immediately after manipulation on the display; in this case, rotation, color correction, silhouetting, etc. As with HCM, this reduces the productivity of the display terminal as it waits for these calculations to be accomplished on the fine file. With Scitex, these calculations appear to go faster due to the use of the array processor on the fine file.

In theory, no disk packs have to be carried around in the Scitex system. In practice, since it can take 6 minutes to copy from one disk to another, disk packs are still carried around the Scitex system.

Once the page is completed on the display, the Scitex system has the capability of doing page composition on any computer that has access to the disk pack where the data resides. This can be done in the background on the least busy computer tied to the right disk.

After page composition, the disk pack is carried, hooked to, or transmitted to the output station for final plotting.

LYNART
TEXTA

Crosfield's basic strategy differs in several significant features from its competitors. Figure 14 is a block diagram of the 860. First, there are four computers in a basic system: input, output, file manager (page composition), and page make-up. Their strategy seems to be intimately tied to the 1024 x 1024 display and its presumed ability to be of sufficient resolution to allow color correction, silhouetting, at the screen resolution, thereby not dealing with the fine file at these display iterations.

At input, two files are developed, the fine file and a view file. The purpose of the Winchester disk on the input station is to allow calculation of the view file. Here, the view file is calculated to be a 1024 x 1024 file (if the fine file is that size or larger). That is the view file will fill the color display and typically represents 1/5 to 1/10 of the pixels of the fine file. Immediately after input to the Winchester, the view file is recorded on the 300 Megabyte pack

which is then carried to the file manager. Note the file manager supports up to four page make-up terminals. When one wants to work on a page, all the view files of the elements of the page are called from the file manager and stored on a 160 Megabyte Winchester at the page make-up terminal. Page make-up proceeds as with other systems, but instead of modifying the fine file, the view file is modified, potentially saving significant display terminal time. Once page make-up is complete, the page composition commands are sent back to the file manager where in a foreground/ background mode, the fine files are manipulated into the final page(s). When this is complete, the pack is carried to the output station for final plotting.

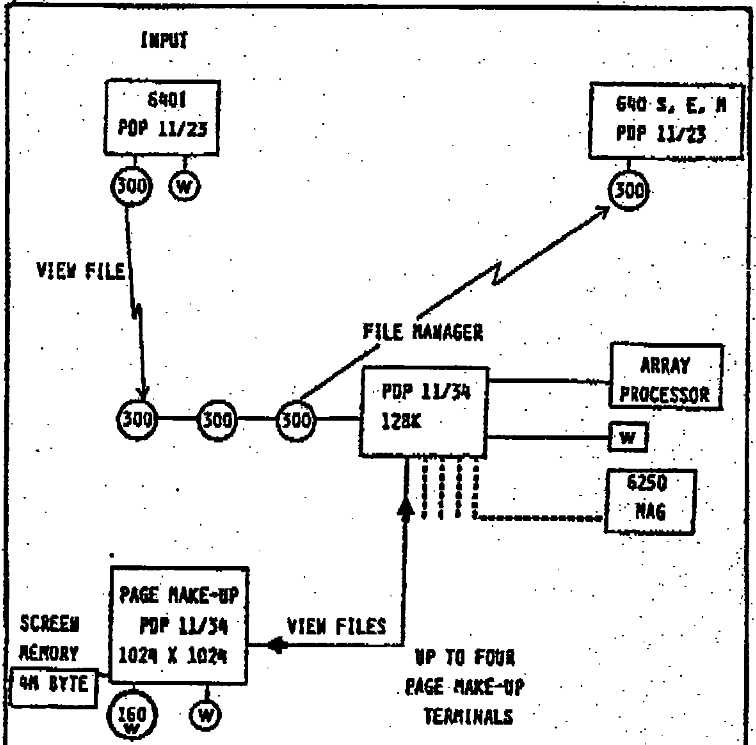


Figure 14: Crosfield Strategy

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Since none of these systems (Crosfield, HCM, and Scitex) are fully operational at this time, one is forced to look at evolving strategies to estimate potential productivity. Further, pricing has not stabilized in the industry, thus it is next to impossible to determine productivity/cost merits. Based on strategy alone, we would rate the likely ultimate productivity of these systems in the following descending order:

Crosfield
Scitex
HCM

Based on usable functions (by existing customers) we would rate the competitors in the following descending order:

Scitex
HCM
Crosfield

Low Resolution Typesetting

We have previously reported that some 50-plus (Reference 3) companies are in various stages of consideration and/or development of various technologies for non-impact printing (NIP). The dominant technology being considered is laser-based intelligent copiers, with other technologies such as ion beam, magnetography, thermal magnetic, ink jet, etc. also being considered. The prime driving forces behind laser-based systems can be summarized as:

- Highest ultimate quality
- Moderate relative capital costs
- Lowest cost consumable (plain paper plus toner)
- High speed

We have previously reported on Tropel, Honeywell, and Litton (Reference 3) as sources of laser scanning modules to be used with slightly modified copier engines. These electro optics houses provide design,

development, and OEM quantity manufacturing to potential system houses. Their designs range from galvanometer to polygon to holographic scanners with polygon scanners remaining the current most popular choice.

We have also previously reported on the Canon, Data Point, Hewlett-Packard Xerox, IBM, Siemens, General Optronics, Konishiroku, Mita entrants into the laser imaging- electrophotographic-based systems (Reference 3). One serious deficiency of all of these systems is a lack of good typeface design used with these machines.

This is being slowly rectified as various leading suppliers of these new imaging systems announce typeface supply agreements with historic typesetter companies (such as the recently announced Mergenthaler/Xerox deal). Look for more such announcements in the near future, such as Monotype who claims large unannounced contracts in this area.

But even more important to the lower cost laser-based NIP systems is the lack of an appropriate image driver for the NIP subsystem. Canon, General Optronics, etc. all suffer from the fact that their laser-based NIP systems are basically dumb bit map video plotters with no capability to receive word processor front-end system codes and set type. These devices are analogous to buying a daisy wheel printer without the daisy wheel.

What is needed is an image driver for these devices, preferably one that can handle typesetting functions, line art, and halftones. Xerox appears to have the lead here with its continuing product announcements. Imagen, a Standford University spin-off, has developed such a device for the Canon LBP-10 system.

Despite the general lack of an "image driver" (i.e. interface with at least typesetting capabilities), the number of OEM suppliers of scanner subsystems is multiplying rapidly.

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- Chesapeake

Brad Merry, formerly of Isomet and Kodak, has formed a new company to provide laser scanning modules based on low cost, solid state (acousto-optic) scanners (Reference 4). These developing products are focused on the 240 lpi, 30 page per minute market. They claim that at this speed range, they can use standard video circuits to reduce the price of the power supply, which has previously caused high prices for this scanning technique.

- Lincoln Lasers

We have previously covered Lincoln Lasers as the leading manufacturer of polygons (Reference 4) for laser scanning as well as a developer of an internal drum scanner intended for laser platemaking type applications.

Now Lincoln Lasers has entered the laser scanning subsystem market with its own "off the shelf" polygon laser scanner, primarily intended for use during the development phase of a new scanner sub-module. It has variable resolution and scan speed to aid in development testing programs. Primary design features include a 2 to 3 mil spot, video rates of 7 to 10 MHz, a digitally driven AO modulator (50 nanosecond), and running at 1200 lines/sec. (or 30 pages per minute). This versatile prototyping scanner is estimated to sell for $24,000.

- Newport Electro-Optics

Eddie Young, formerly with Harris, has formed (with the support of Newport Research) another company to provide a scanner subsystem based on a variety of scanning mechanisms. Like Chesapeake and Lincoln, Newport will initially focus on the 240 - 300 lpi scanners for the laser NIP market. All three companies are said to be interested in the 1000 lpi-plus area for the graphic arts.

- General Scanning

General Scanning is also rumored to be entering the OEM and systems scanning business. General Scanning is the leading supplier of optical galvanometer scanners, such as used in the initial EOCOM Laserites (as provided to The Los Angeles Times).

E. Summary - Laser NIP

Figure 15 summarizes the OEM suppliers of laser scanning subsystems.

Honeywell
Litton
Tropel
Chesapeake
Lincoln Lasers
Newport Electro-Optics
General Scanning

Figure 15: OEM Suppliers of Laser NIP Kits

Note in Reference 2, we made the case that laser NIP kits, in quantity, can be procured for around $3,000. More importantly, it is not expensive to increase the resolution of these devices to 500 lpi. At 500 lpi, these devices, as producers of originals, will compete favorably with the printed result of offset, where the original imagery is typically 1000 lpi, but then is degraded by 5 or more image transfers in going from typesetter output to ink on paper.

If one extends these types of costs versus performance data, several things can be projected:

- 500 lpi proofing devices will be capable of high quality proofing.
- 500 lpi direct original copy devices will compete favorably against short run offset.
- Laser typesetters, when mature as a technology, will cost less to manufacture than CRT typesetting.

- Combined with the ability of current laser typesetters to set text, line art and halftones at text speeds, bodes well for laser typesetting technology, as well as laser NIP for proofing and original copy generation.

Typesetting - More Suppliers

As the industry struggles to make the transition to full page output of text, line art, and halftones, very interesting things are happening. First, concurrent with the development period for new full page devices, the typesetting industry is undergoing a significant stabilization in the markets for 2nd and 3rd generation devices. The result of this is curtailed R/D dollars for the transition to full page devices inclusive of halftones, thus historic suppliers of typesetting equipment are trying to milk current technologies which are not suited to the evolving digital printing and publishing industry.

This is leading to some strange developments in the typesetting industry.

- At least four front-end page make-up suppliers have active programs to build output laser scanners that will, in the end, be typesetters; setting type, line art, and halftones at the same speed.
- EOCOM, through its Raster Image Processor development, plans to move into the typesetting business.
- Kodak and Agfa are likely to support their recent acquisitions with laser compatible materials. Both Kodak and Agfa have experience in laser scanning; and both have a vested interest in the laser NIP market.
- Scitex, HCM and Crosfield are bringing text into their color page make-up systems.

Thus, a field already in trouble, will see a real increase in vendors, with the new vendors depending on full page output and 4th generation technology for their success.

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The Seybold Report
on Publishing Syste[redacted]

The Hell Chromacom:

A Tool for Today, a Vision for Tomorrow

HELL IS THE LARGEST SUPPLIER of color-separation scanners. (Hell's own estimates are that it has 60%-65% of the U.S. market, and 52% of the market worldwide.) For many quality-conscious color printers these machines have become the preferred means of producing sized and screened color separations from original transparencies or color prints. In the last decade, Hell, Crosfield, and other companies began work on digital color systems which would allow manipulation and assembly of color images to be performed in between the input scanning and output writing operations of a color separation scanner.

Actually, as often happens when new technology hits an industry, the key innovator in this field has been neither of the two established firms but Scitex, an "upstart" which has entered the graphic arts industry from other fields and has brought along its own technology and insights. Both Crosfield and Hell were hard at work on development of digital color systems long before Scitex appeared on the scene. But both have clearly been influenced by what Scitex has done and by the way in which Scitex has been able to capture the imagination of the marketplace.

Scitex brought its system to market first. Crosfield, whose highly modular approach made it possible to install systems for page layout and assembly without any color preview or correction facilities, followed quickly. However, Crosfield has had difficulty getting the final pieces of its system to the field.

Hell, by contrast, chose to tackle a full-function system, rather than to proceed modularly. It has been building a substantial base of installations over the last two years.

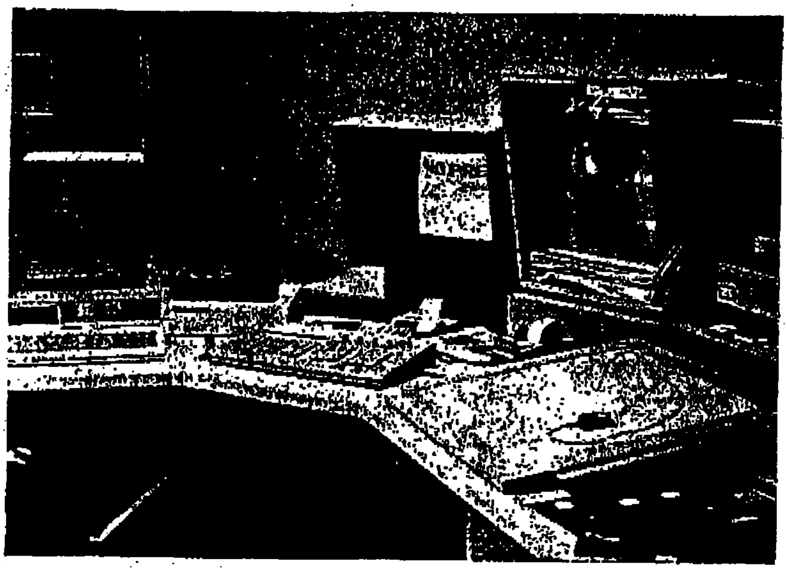
In certain areas (particularly real-time image sizing and rotation and manual switching of disks) the Hell system is still somewhat less sophisticated than Scitex's. However, the system is now selling very well indeed and sales momentum is encouraged by virtue of the the large installed base of Hell scanner users. The current high value of the dollar in relation to the Deutschmark is also a positive factor. (Scitex prices are based on U.S. dollars so that exchange rates, at least in relation to the mark, are not relevant.) But beyond this, the Hell system appears to be a sensible and practical production tool.

For the future, Hell, like Scitex and Crosfield, intends to incorporate the ability to generate and output text as well as graphics. And, like Scitex, it intends to move "upstream" in the production cycle with development of a less-expensive workstation which can be used for design and page layout.

Electronic color systems have caused the blurring of the traditional craft distinctions between color separation, retouching, and stripping. In the same way, new developments in incorporating text are blurring the distinction between color operations and typesetting. The design and plate-making functions are next on the list of areas to be incorporated. We are beginning to see the emergence of total systems which will handle all pre-press functions in an electronic environment.

Also in this issue

In our coverage of the Print '80 show at which these color systems burst onto the U.S. scene (Vol. 9, No. 16/17), we noted that they foreshadowed "the day when handling of text and graphics are far more clearly tied together than they are today." That day is dawning now.



The Combiskop, heart of the Chromacom system. *This workstation permits page assembly, retouching, color adjustment, and a variety of other operations.*

The Hell Chromocom Digital Color System

THE HELL CHROMACOM SYSTEM (marketed by HCM in North America) is a tool for the electronic assembly of full pages of color imagery. The output of the system is screened and color-separated film, ready for platemaking (or, for gravure, since a digital cylinder engraving machine may be driven directly). The key component of the Chromacom system is the Combiskop, a workstation at which scanned-in images can be assembled into pages and a wide variety of adjustments to the individual images and the page as a whole can be made.

For Hell, the Chromacom system is the latest step in an evolutionary series of products. Unlike their most important competitor in this market, Scitex, Hell has a long tradition of providing electronic products to the graphic arts industry. It is a background emphasized both by Hell and by its loyal customers.

Company history

The Chromacom system is manufactured by Dr.-Ing. Rudolf Hell GmbH in Kiel, West Germany. The company was founded in Berlin in 1929 by Rudolf Hell. Dr. Hell was 28, and he had already written a book on the infant technology of television. (Hell and his professor, Max Dieckmann, had made the first public demonstration of wireless transmission of television pictures.) Among the first products offered by the new company were facsimile machines for newspaper use. Facsimile continues to be an important Hell product area to this day. Other early product lines included radio compasses, direction finders, and Morse code recorders.

At the end of World War II, in 1945, Hell ceased operations. It was re-started two years later, in Kiel. The initial activity was repairing facsimile and Morse code recorders, but soon a variety of other tasks occupied the company: restoring the newspaper wire-service network, building a facsimile service for the Post Office, and designing a phototypesetting system. As time went on, Hell concentrated more and more on products for printing and publishing.

Hell's best-known products today—the line of color-separation scanners and related equipment—stem from a 1953 demonstration in which facsimile transmission was used to engrave a printing plate directly, instead of requiring photoengraving as an intermediate step. The initial product, called a "Klischograph," made raised plates for black-and-white letterpress. Color capabilities, and output suitable for offset and gravure, followed later. The direct-engraving technology led to the current "Helio-Klischograph" product, which engraves gravure cylinders directly using diamond styli under computer control. The color scanning technology led to the present "Chromagraph" family of scanners.

Hell also makes equipment for typesetting—the Hell "Digiset" systems, which were introduced in 1965. These have sold well in Europe, particularly in Germany and in Switzerland, Austria, and Yugoslavia. Digisets have been sold in the U.S. market two different times by two different companies. When the Digiset was first introduced, RCA and Siemens had a cooperative agreement (Siemens sold RCA computers under its own name in Germany). The original Hell Digiset was sold in the U.S. as the RCA VideoComp 820.[1] (RCA also sold Hell color scanners.)

More recently HCM, Hell's North American subsidiary, offered the Digiset 20T typesetter in this market. But the machine was late into the market, higher-priced than its American competitors, and did not offer a full library of U.S. type faces. It has since been withdrawn, but it continues to sell well in Europe.

Products for the printing industry dominate Hell's output. The current annual report does not give figures on prod-

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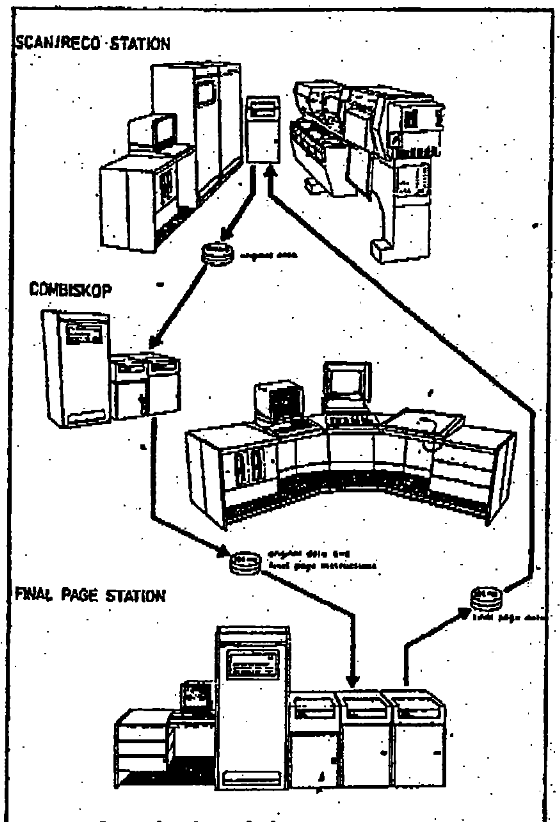
[1] Eventually, the VideoComp and the Digiset evolved into completely separate product lines. Later RCA VideoComp models were hybrid machines with an RCA "front-end" (the computer/controller) and Hell "back-end" optical bed. The VideoComp product line was subsequently acquired by Information International. Since then III and Hell have proceeded on their own separate development paths. Current III VideoComps and Hell Digisets share no components in common.



Organization of Chromacom System

uct areas, but a 1979 report showed that over 80% of Hell's sales were printing-related. In 1979, 62% of sales were of scanners, engraving machines, and related equipment; and 19% were phototypesetting-related. Facsimile devices contributed 17% and textile equipment 2%.

Hell is now a wholly-owned subsidiary of Siemens AG. Siemens, the giant European electrical and electronic conglomerate, having held an 80% interest in the company, purchased the remaining 20% from Dr. Hell in 1980. (Dr. Hell, now 81, is honorary chairman of the board.) Hell's sales for 1980/81 were 395 million marks (about $186 million) with an after-tax profit of DM 22 million. Total sales for Siemens were DM 32 *billion* in 1979/80.

International scope. Hell is very much an international company, with 72% of total output being exported. About half of Hell's sales are in Europe (including Germany), approximately a quarter are in North America, and about 10% in Japan.

The Chromacom system

Although it contines to sell "straight" scanners, the key to Hell's future clearly lies with the Chromacom digital color system and its related input scanners and output recorders. The basic principles of such a system are by now familiar to most of our readers. Continuous-tone color transparencies or prints are "read" on a color-separation scanner and recorded onto disk as digitized continuous-tone (unscreened) pictures. The amounts of data thus recorded are immense: each sample point, of which there are typically 300 per inch in each dimension, is represented by 24 bits of data. This means that for each square inch of image area, there are roughly two million bits (or a quarter of a megabyte) of data. This much data cannot be displayed and manipulated in real time with today's technology, so a coarse-resolution sampling is used for operations like color correction, image placement, and retouching, which have to be done interactively. The functions performed by the operator on the coarse data are then repeated on the full resolution data as an off-line process, called "final page processing." The final step is to record the completed page as sets of color-separated negatives. The screening is performed at this time.

The way data is transferred from one process to the next is usually by moving a disk pack from one disk drive to the next, although Hell has recently begun offering a facility which avoids the necessity of doing this.

The Combiskop

The Chromacom system has several "stations," some essential and some optional (the details are provided under "Putting together a system"), but all that is absolutely necessary is a scanning and recording station and a Combiskop station.

The Combiskop is the heart of the Chromacom system. It is the capability of the Combiskop which make it possible to do things with images which could not have been done conventionally. These facilities include page-assembly, color correction, and retouching. The Combiskop is also a key element in the cost-effectiveness of the Chromacom in use. The number of pages per hour that can be run on the Combiskop, and the number of times a given page has to be called back to the Combiskop because of revisions requested after proofing, are likely to determine whether the whole system can pay for itself or not.

Because of its importance, we will describe the operation of the Combiskop in detail.

The operator controls the Combiskop primarily using two input devices: a function box (to indicate which operation is desired) and a digitizing tablet (to indicate positions on the screen). The operator sees the effects of each operation on a video display screen. Movements of the "puck" on the digitizing tablet are reflected in cursor movements on the screen. Most operations involve a single cursor, but for some two cursors are displayed. There is also an alphanumeric VDT at the Combiskop, but this is little used. It is primarily intended for running utility programs. During Combiskop operations, the VDT displays a "job listing" of each function the operator invokes. Error messages are displayed on it.

Image size and resolution. Before describing the functions, which are available on the Combiskop, a little bit of background is needed concerning how images are stored and displayed.

The screen of the Combiskop can display a maximum of 512 "pixels" (image points) in the horizontal and vertical directions. An 8" square image, at 300 dots per inch, requires 2400 pixels in each direction to be shown at full resolution. Such resolution is beyond the state of the video-display art,

so the Combiskop (or any competing product) must show either the whole image at reduced resolution or a portion of the image at full resolution.

The Combiskop offers both possibilities. It keeps each image on disk in two forms: full resolution and coarse resolution. The latter is computed from the former by taking a center-weighted average of a square block of pixels and using that average to represent the whole block when displaying the image at coarse resolution. For example, the coarse resolution image might have one pixel to represent each group of 49 pixels (*i.e.*, a 7×7 block) in the full-resolution image. In this example, the coarse-resolution image would contain roughly 2% of the number of pixels in the full-resolution version. Depending on the scanning resolution and the degree of enlargement required, the number of full-resolution pixels per coarse-resolution pixel could vary. For instance, line art is scanned at very high resolutions (up to 1800 lines per inch) so the coarse-resolution data for screen display might have only one pixel for each 20×20 block of full-resolution data.

The final size of a piece of art generally needs to be determined at input scanning time, because that is when the two disk versions are created. As will be seen, it is possible—but time-consuming—to change the size of an image at the Combiskop.

Either resolution image can be loaded into image memory and displayed on the screen. If full resolution is chosen, a 512-pixel-by-512-pixel block is loaded. Generally, this is only part of the whole image. Some operations are handled best at full resolution, and these must often be done one piece of the image at a time.

To complicate matters further, there are two other operations that affect the size of an image on the screen. One is the "zoom" feature, which causes apparent enlargement of an image by "pixel replication." This consists of copying each image pixel several times in the vertical and horizontal directions so the size of the image is increased without any new data being introduced. The available zoom factors are 2×, 4×, and 8×. The operator can apply the zoom feature to whatever is on the screen—either full- or coarse-resolution images—and the change is instantaneous. Zoom is provided for operator convenience and has no effect on the underlying image data.

The other operation affecting size is the "rotation and scale change" function. This is a function which can be used to change both the size and orientation of an image. It is relatively slow. Depending on the size of the object to be rotated, it may occupy the system for several minutes after the operator has indicated the desired size and orientation. This is the only operation which can actually change the size at which an item will be output from the size specified during scanning.

We note that Scitex now has interactive on-screen sizing and rotation facilities on its system. This is, we think, a very useful feature and one which Hell should add. To do so, Hell would need to use special-purpose hardware, designed for the task, just as Scitex does.

Image memories. The Combiskop can seem complicated at first glance. But the principles of working with it are simple. The key technical notion that is required in order to understand the Combiskop and its procedures is the idea of an "image memory." This is an area of computer memory set aside for storing pictures temporarily while they are being worked on.

For the most part, images are stored on disk. But when they are to be displayed, they are called into the image memories of the Combiskop. There are two image memories, so two different images can reside in the Combiskop at one time. The operator can select the image in either memory for display on the screen. The normal page-assembly procedure is to call each image in turn from disk into memory two; perform operations like retouching, color adjustment, and mask creation; then add it to the page which is being assembled in memory one. After the page is completed, it is written back to disk from memory one.

Masks. Although they cannot be seen in the finished page, masks are a fundamental part of color image assembly, both in conventional processes and on electronic systems like the Chromacom. Masks isolate an image area for subsequent manipulations. They can be thought of as "windows" of arbitrary shape through which a specific image can show.

For example, if the operator wants to pick up an item (a tape recorder, for instance) out of a scanned-in image and put it into a page which is being assembled, he can use a mask

The page-creation process. *This simplified demonstration page begins with a mask* **(left)** *and a page-size color vignette* **(left center)**. *A border is added, one piece of art is placed within the border, and a window for a second piece of art is created* **(right center)**. *The second piece of art is positioned in the window, completing the page* **(right)**.

which blocks out the unwanted background from the tape-recorder picture, and leaves only the recorder itself showing through. When the mask and the picture are placed together on the page the mask permits the existing page to display only to the extent that it is outside of the area occupied by the recorder. Anything which was in the area now occupied by the recorder is hidden. This is an example of what Hell calls "foreground" masking, since the mask causes the new image to be placed "on top of" the existing page.

Another type of masking, "background" masking, occurs when a mask is positioned on a page and an image is positioned behind it. For example, suppose the layout calls for the tape recorder to appear in a framed box inset into the upper left-hand corner of the page. In this case, a rectangular mask and a computer-generated frame would be created first in the proper position on the page. Then the tape recorder image would be called to the screen. The mask would function as a window through which part of the tape recorder image could be seen. Moving the image freely with the digitizer "puck," the operator would position the tape recorder within its stationary frame. No part of the page outside the frame would be affected. The new image appears to be "in back of" all the existing page elements.

A final type of masking, which is called "mixed ground," involves two masks. One mask, which is stationary, protects parts of the existing page from being covered by the new image. The other mask, which moves with the new image, causes it to cover unprotected areas of the page. Thus, as the new image is moved around the partially-assembled page, it will disappear behind some objects and hide others from view.

Creating masks. The importance of masks should be clear by now. Quite a bit of what the Combiskop operator does is related to creating and using masks.

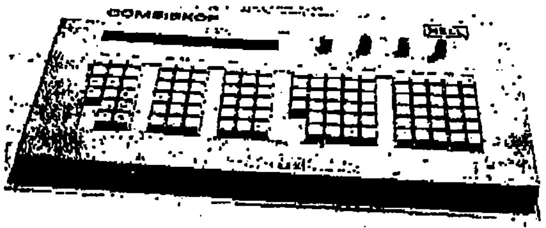
There are three ways to create masks at the Combiskop. The easiest type of mask to create is the machine-generated geometric shape. The Combiskop will automatically generate rectangles, circles, ellipses, and polygons from points input on the digitizing tablet.

If the background of an image is to be masked out, and if that background is of fairly uniform color, there is an automatic masking function which can create a mask covering all areas which are of that color (or very close to it). If the background is non-uniform, or if the image of interest contains areas of the background color, this method is less useful.

The final method of creating a mask is simply to draw it on the screen, using the digitizing tablet. This process, called "contouring" by Hell, must be done at full resolution. Buttons on the digitizer's puck permit either creation or erasing of mask areas.

After a mask has been created, it can be stored in any of seven mask memories of the Combiskop. It can also be written to disk for future use. If a mask which has been stored on disk is needed again but in a slightly different form, it can be called back to the screen for editing.

Using the Combiskop. The operator tells the Chromacom what tasks to perform via a function box which has a key for each function. The keys of the function box are in five groups. In the middle is a numeric keypad. At the left are a group which controls the cursor and digitizing tablet and a group which controls the display and placement of images and masks. At the right are a group which cause masks and frames to be generated, and a group involving generation or correction of color.



The Combiskop function keyboard. *The keys are in functional groups. The four knobs are for color adjustments. Below the word "Combiskop" is a single-line display showing the last keys pressed.*

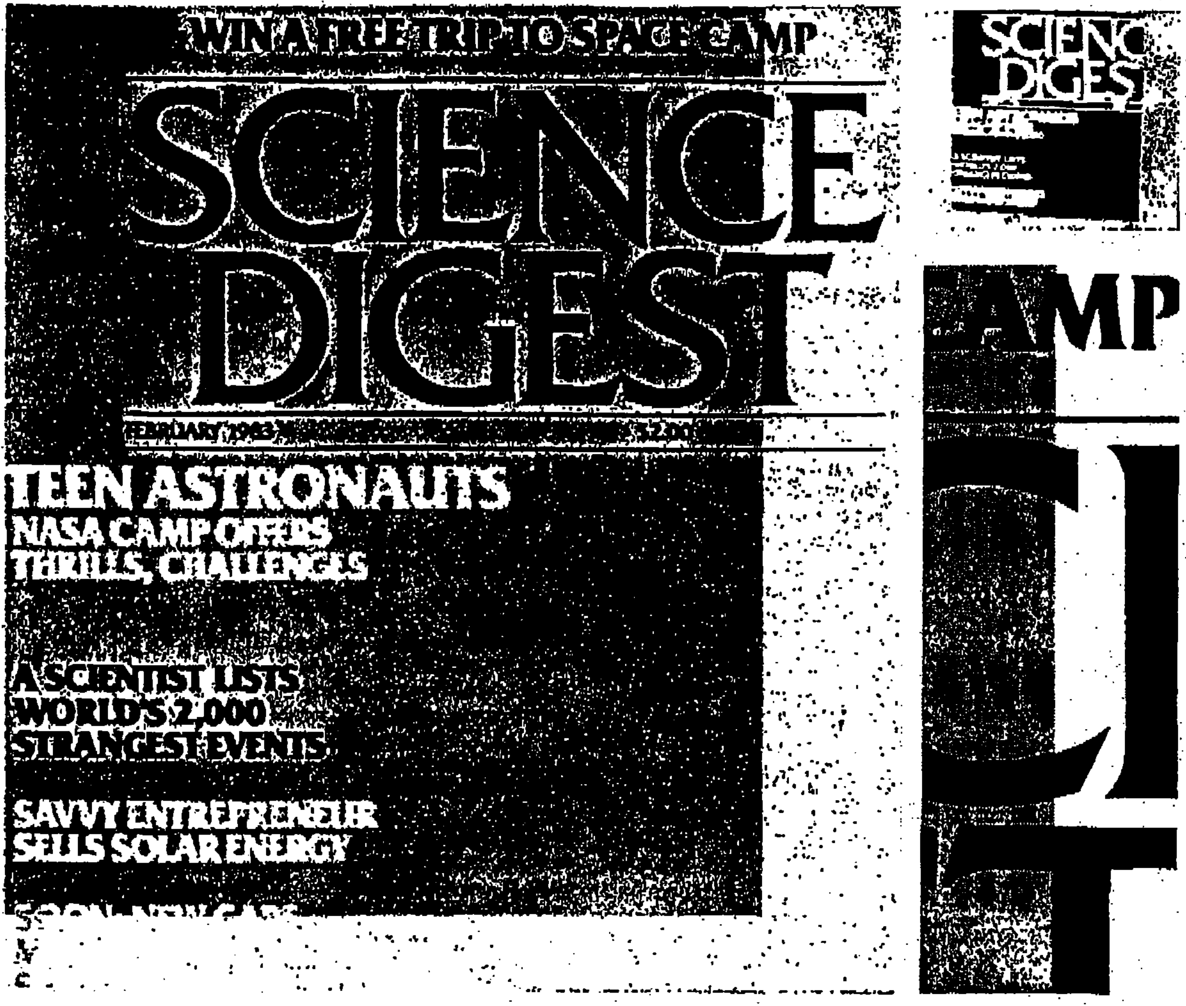
The layout of the function box is sensible and seems reasonably easy to learn in spite of the large number of keys (there are about 100 keys). It may seem like a small point, but we are surprised that Hell does not provide English-language abbreviations on the keys for systems sent to English-speaking countries. Some of the German abbreviations are close enough to the English equivalents to be useful (*e.g.*, "KEL" for "create ellipse"), but many are not ("FWD" for "define color value;" "BDM" for "rotate and scale image"). We think it would be very desirable to change these abbreviations, as well as those in the job listing (*see below*) to reflect their meanings in English.

The commands in the first function-box key grouping (cursor and digitizer commands) are basically set-up commands. They don't cause any modification of images. This group of commands includes selection of the shape and color of the cursor, the choice of which cursor to move next (when both are being displayed), and adjusting the positions of the on-screen cursor and the "puck" of the digitizing tablet so that the layout corresponds properly with the image on the screen.

The next group is the image and mask-manipulation commands. These include such things as loading images from disk (either at full or coarse resolution), loading masks from disk, positioning images and masks on the page, and changing the zoom factor. Also in this group is the auto-mask command, whose use was described earlier.

The next group of keys controls the creation of machine-generated frames and masks. Rectangular, circular, elliptical, and polygonal masks and frames can be created. Frames can be of any specified thickness and can have rounded, angled or square corners. A frame may be created so that it lies along the inside of the border of a mask, along the outside of the border, or so that it straddles the border. Also in this group are the contouring commands for drawing masks freehand. Two additional functions that are in this group are those which cause rotation and enlargement of images and masks.

The final group of functions are those concerned with color manipulation. One set of vignette-defining keys permits the operator to enter specific color values at selected points and the system generates a vignette that incorporates those colors at those points. Another set is used for retouching. The operator can select the size, shape, color, and speed of action of the electronic retouching "brush." Another set applies conventional color corrections to the highlights, middle tones, or shadows of an image. All of these functions may be



Working with scanned-in type and rules. ***Left:*** *This magazine cover demonstrates working with line art. Blocks of type were given various solid colors and vignettes.* ***Top right:*** *The job displayed on the Combiskop screen.* ***Bottom right:*** *The colored type is "spread" under the dark background, but where it emerges onto the white paper it is not. (Yellow separation negative, 200%).*

applied to the entire image, or their effect may be restricted to an area defined by a mask.

The job listing. As each function key is pressed, its abbreviation appears on the alphanumeric VDT associated with the Combiskop. There is usually not much need to refer to this "job listing" during normal operation, but it does serve an important function if the job needs to be rerun in a slightly different form at a later time, or if the operator discovers, part way through a job, that some step had been omitted earlier in the page-assembly process.

In situations like these, the job listing can be rerun, providing a kind of "instant replay" of the operations that have been done on the Combiskop. The only things which have to be re-done are those (such as retouching) which involve cursor movements during the operation. Furthermore, the job listing can be edited. This means that if two jobs differ in only a few details, the job listing from the first may be edited to produce a listing which will cause the second to be run automatically. We'll return to the job listing in describing the Layout Programmer station.

Final page processing

After all operations at the Combiskop have been completed, and before a page can be output, there is a step called "final page processing" through which the image data must pass. When a page is assembled on the Combiskop screen, most operations are carried out at coarse resolution. The full-resolution data still resides on disk in its original form. Two things have to happen before the output process can begin: all of the retouching, rotating, masking, and other image-altering steps which were done on the Combiskop have to be applied to the full-resolution data; and the various pieces of the image have to be sorted into the raster sequence in which they will be output.

This process can be lengthy. In some cases, it may even exceed the time it took the Combiskop operator to assemble

the page. This process can be done on the Combiskop, but since it involves only the minicomputer and not the operator's console, and since the Combiskop cannot be used for normal operations when it is running the final page process, it generally doesn't make sense to use the Combiskop for this process. For this reason, most Chromacom purchasers buy a "final page station"—an extra minicomputer with a pair of its own disk drives dedicated to performing just this operation.

Putting together a system

Chromacom jobs go through three major steps: input, assembly, and output. Input and output are handled by what Hell calls the "Scan/Reco" (for scanning and recording) station, and assembly is done at the Combiskop. The minimum configuration consists of just these two stations.

Scan/Reco. The Scan/Reco station can use a standard Hell scanner (the DC 350 or the large-format CP 340) for both input and output. Or one of the new output recorders *(see below)* can be used, leaving the scanner to perform input only. The DC 300B can be used as an input scanner but not as a recorder. In any case, there will be a Siemens minicomputer with an operator's VDT and at least two 300-MB disk drives. A scanner being used as a Chromacom input and output device can still be used normally as a stand-alone scanner when it is not needed for use with the system.

Combiskop. The Combiskop station consists of the Combiskop itself (including the display electronics, the digitizing tablet, and two floppy-disk drives) and a second Siemens minicomputer with VDT and 300-MB drives. At this station, there would also be an 80 MB drive for software and stored job files.

Final page station. Very few customers would choose this minimum configuration, however. There would almost always be a third minicomputer-plus-disk station at which final page processing would occur. (The alternative would be to run the final page processing on the Combiskop station, but this would make it unavailable for normal operations for periods of 15-30 minutes or more per page.)

Output recorders. Hell offers several alternative output devices for the system. The standard Hell scanners have already been mentioned. In addition, there are two output recorders and a proof-recorder. The CR 401 automatic recorder can handle film up to 21" × 29". It loads its own film, exposes it automatically, and deposits it in an output cassette or straight into a film processor. It doesn't require a darkroom. The CR 402 is a large-format recorder that can handle 44" × 50" film (the same as the CP 340 scanner). It is hand-loaded and must be operated in a darkroom.

The CR 403 proof-recorder is an interesting new product, introduced at DRUPA. It handles 21" × 29" color film or paper on which an unscreened proof can be recorded. It produces its images using two lasers. One is a Helium-Neon laser with output in the red portion of the spectrum. The other is an Argon laser with both blue and green components in its output. The blue and green portions are optically separated, making three beams in all. The three beams are independently modulated to expose the full-color image on photographic film or paper.

Layout Programmer. Another option which could speed workflow in a heavily-loaded system is the "Layout Programmer." This workstation offers the same frame and mask generating options as the Combiskop, but it doesn't handle scanned images and the various image-related functions (color-correction, airbrushing, etc.) are not available. The bulk of the work of many jobs, however, can be handled with just the functions that are available on the Layout Programmer. The Layout Programmer does not show the true colors of frames and tint areas. It can display only eight different colors. However, the operator can specify the color value that each item will have when it reaches the Combiskop.

The operations at the Layout Programmer are recorded on floppy disk as a job listing. This is subsequently "played back" on the Combiskop. At each point where the Combiskop operator needs to intervene, the job listing will include a "pause" command. The Combiskop operator can then make whatever corrections or adjustments the job calls for and resume running the job. (Further enhancements to the Layout Programmer are in the works, as described in "Plans for the Future.")

Data transfer. A high-speed magnetic tape facility (6250 bits per inch, 75 inches per second) is available for archiving and for transferring image data to other sites.

Each Chromacom "station" is essentially a stand-alone subsystem with its own minicomputer and disk drives. Within the Chromacom system, the normal way to move image data from one "station" to the next is to stop the disk drive on one station, remove the disk pack, and install it on the drive for the next station. This process is not good for disk packs or drives (both of which fare better if they are turned on and left) and it is an operational nuisance to be constantly moving disk packs around.

Hell has announced a data-switching facility which addresses this important problem. With the data-switching "network" option, a given disk drive can be connected to any of the stations without removing the disk packs. Thus, as a job moves from input scanning to Combiskop to final-page processing to output, it remains on the same disk drive but that drive is connected to each station in turn. The switching facility comes in three "levels." The minimum level provides a manually-operated switchbox which performs the switching function and nothing more. The second level provides automatic switching under the control of a minicomputer. The third level provides additional software on the switching minicomputer for such things as job tracking, cost estimation, and system-wide file management. These facilities will give Hell a file-management capability similar to Scitex's.

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HCM Graphic Systems, Inc.
300 Rabro Drive East
Hauppauge, NY 11788
Telephone: (516) 582-6520

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Grenzstrasse
2300 Kiel 14, West Germany
Telephone: (04 31) 2 00 11

Flat-bed scanner. In early 1984, Hell will begin deliveries of a high-speed black-and-white flat-bed input scanner, the CN 420. This scanner can accommodate a broadsheet newspaper page (the scanning area is 19" × 23½") and is derived from Hell's products for the newspaper facsimile market. It will be able to handle both transparent and opaque originals. Resolutions up to 2500 lines per inch will be supported. At 1830 lines per inch, it can scan at a rate of 4.6 seconds per inch, which is equivalent to a broadsheet page in just over a minute and a quarter. This scanner will be useful for scanning type, line art, and pre-screened halftones.

Architecture of the Combiskop

The apparent simplicity of operation of the Combiskop belies its complex architecture. The interactivity of the display is the result of some very sophisticated image-processing that goes on continuously inside the Combiskop.

There is a Siemens minicomputer associated with the Combiskop, as there is with each station of a Chromacom installation. But the minicomputer provides very little of the processing power that is resident in the Combiskop. The main image-processing capability resides in a special-purpose display processor which Hell buys from the DeAnza division of Gould Corporation. This processor is under the control of a DEC LSI-11/23, which, in turn, is connected to the Siemens minicomputer. The 11/23 accepts data from the function box and digitizer and handles the floppy disks, as well as giving the DeAnza unit its instructions.

The DeAnza display processor's full-time function is to keep the color display running. In the process of doing this, it recomputes the color value of every one of the quarter-million pixels on the screen every thirtieth of a second. The processor gives each pixel a 24-bit value. Eight bits each are used to define the red, green, and blue components at each point. There is enough memory for two such 512-by-512-by-24-bit-deep images, plus a third temporary area of the same size used during retouching and other image alterations.

There are also eight "overlay" areas, each 512 by 512 by one bit. These are the basis for the Chromacom masks.

The image processor is constructed so that the screen is constantly refreshed by reading the entire contents of one of the image memories every thirtieth of a second. A number of processes, such as color adjustment and image shifts in the vertical and horizontal direction, can be done "on the fly" in the circuits between the image memory and the video tube. This gives the Combiskop its fluid interactivity for these processes. The "zoom" feature is also handled by this hardware, as are the two cursors.

The DeAnza processor can also produce displays from data which is partly being read from one image memory and partly from another. One of the overlay memories acts as a "switchbox" for the processor. In any position where the overlay memory contains a "one" bit, the data from one image memory is used. Positions where the overlay has a "zero" bit are read from the other memory. This feature underlies the masking capabilities of the Combiskop.

The raw processing power of the display processor is awesome. It is best appreciated by considering the difference in response times between functions like moving a picture around on the screen or changing the zoom factor (which are both instantaneous) and generating a vignette (a number of seconds) or rotating a sizable image (a number of minutes). The latter functions are done by software in the LSI-11/23, the former by the DeAnza hardware.

In fact, we think that Hell needs to push DeAnza for hardware to support real-time sizing and image rotation. This is one area where the current Scitex system offers a clear advantage over the Chromacom. Scitex's initial offering suffered from the same problem, but a hardware solution has since been found.

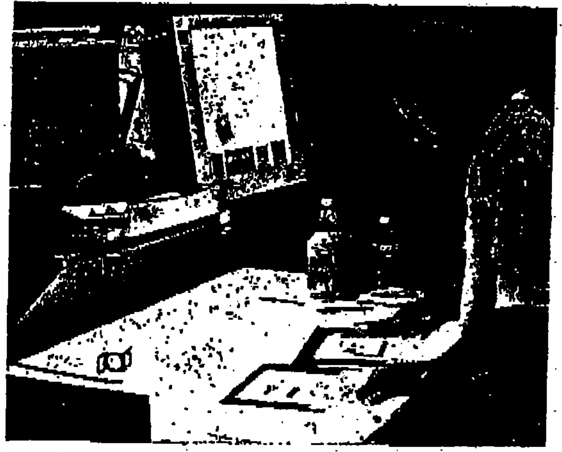
The Chromacom in the field

To get an understanding of what the Chromacom system means to its users, we visited two user sites. They were remarkably different in their approach to the system. One user, Kwik International in New York City, had been using the system for over two years. The emphasis at Kwik was on fast-turnaround advertising work. Kwik's history of color-separation work goes back many years before the Chromacom. Kwik has impressive facilities for all types of prepress work, both conventional and electronic. They were shown to us by Kwik's president, Dan Sirota.

The other user was Time-Life Books in Alexandria, Virginia. The system there was brand new and not yet in use for real production jobs. The system was purchased for in-house use, primarily in the production of high-quality "coffee-table" books. Time-Life Books had *no* prior experience with in-house color separation before purchasing the Chromacom. Tom Boynton, project manager, showed us around the carefully designed and appointed facilities.

A question we put to both Sirota and Boynton was their reason for selecting the Hell system over the competitive Scitex offering. Both men had obviously been asked the question many times before. They gave several reasons, but the most important one seemed to be the ability to get the entire package, including maintenance and support, from a single vendor. Scitex does not make an input scanner, so Scitex installations inevitably involve multi-vendor support.

Both Boynton and Sirota felt that type and line-work should normally be handled separately on film and not be run through the system. Boynton pointed out that Time-Life



Dot-etcher checking negatives. *Dot-etching is one of several labor-intensive steps which the Chromacom system bypasses. This photo was taken at Kwik International.*

books are often published in several languages, but with the same layout and pictures. If the type is on separate negatives, then only those negatives need to be re-done when a book comes out in translation. If the type were handled on the system, it would appear on the same negative with the black separation.

Sirota gave a different reason for keeping the type separate. Eighty percent of changes called for at the proof stage are changes to the text. These changes are easily handled conventionally if the type is on a separate piece of film. It would be inefficient to go back to the Combiskop to make simple wording or price changes in an ad. Sirota noted, however, that there are times when it makes very good sense to scan type and line art. This is often the case, for example, when tints or vignettes involving line work are called for. Kwik had recently taken a job which required that a black-and-white engineering drawing with lots of fine lines had to be reproduced as a color job with the lines being one tint and the background another. It would have been extremely difficult to do using conventional masking and stripping techniques, but it was easy on the Combiskop.

On the subject of cost-justification, Boynton had some very specific projections concerning the Time-Life installation. He said that the current annual cost of outside color-

(Text resumes on page 15.)

The insert which follows this page was provided by HCM to illustrate some of the capabilities of the Chromacom system. ➔

Chromacom user list

As of this writing, the Chromacom has been installed in North America at the following thirteen sites:

Bomac-Batten
Toronto, Ontario, Canada
Gravure Systems
Florence, Kentucky
HCM Demonstration Studio
Los Angeles
HCM Demonstration Studio
New York, New York
Kwik International
New York, New York
Lehigh Electronic Color
Chicago, Illinois
Lanman Lithography
Orlando, Florida
MacLean Hunter Publications
Toronto, Ontario, Canada
Pacific Lithograph
San Francisco, California
R.R. Donnelley
Chicago, Illinois
Spectrum Incorporated
Minneapolis, Minnesota
Time-Life Books
Alexandria, Virginia
Weston Engraving
Minneapolis, Minnesota

Seven more systems have been sold, but not yet installed, in the following locations: Boston; Los Angeles (two systems); Long Island, New York; Philadelphia; Portland, Oregon; Toronto, Ontario.

In Europe, there are 53 Chromacom installations as of this writing.

Adplates Ltd.
London, England
Angsö Lito AB
Stockholm, Sweden
A/S Cliche
Oslo, Norway
Burda GmbH
Offenburg, W. Germany
Cino De Duca
Blois, France
Cino De Duca
Maison Alfort, France
Coop Offset
Montreuil, France
D. S. Colour International Ltd.
London, England
De Buck & Paulich
Wetteren, Belgium
Graafinenstudio
Helsinki, Finland
Francois Imprimerie
Ozoir-la-Ferriere, France
Hell-Studio
Kiel, W. Germany
Hellectron f. Studio
Stockholm, Sweden
Helsingvin Kuvalaattatehdas Oy
Helsinki, Finland
HTF Scanner Team
Krefeld, W. Germany
Ifte
Turin, Italy
Interrepro
Münchenstein, Switzerland
Köhn Repro
Copenhagen, Denmark
Krammer
Linz, Austria
Kunnallispaino
Vantaa, Finland
L. Europe
Brussels, Belgium
Leleux
Brussels, Belgium
Laudert & Co.
Vreden, W. Germany
Malmö Repro-Kopia AB
Malmö, Sweden
Mayday Reproductions Ltd.
London, England
Mohndruck
Gütersloh, W. Germany
Mondadori
Verona, Italy
Neflex
Zug, Switzerland
NEFLI
Haarlem, Netherlands
Neue Chemiegraphie AG
Zürich, Switzerland
Nureg GmbH
Nuremberg, W. Germany
Oestreicher & Wagner
Munich, W. Germany
Otava
Helsinki, Finland
Pershke f. Studio
Mitcham, England
Pesavento & Co.
Zürich, Switzerland
Photomatic
Lyon, France
Prolith AG
Köniz, Switzerland
Promograph S.A.
Madrid, Spain
Repro Zentrum
Klagenfurt, Austria
Reprostudy S.A.
Hosp. de Llobregat, Spain
San Paolo
Alba, Italy
Sebald Druck & Verlag
Nuremberg, W. Germany
Schaufelberger AG
Winterthur, Switzerland
Schauffler
Frankfurt, W. Germany
Schmidt
Stuttgart, W. Germany
Schmidt-Repro
Dornbirn, Austria
Siemens f. Studio
Milano, Italy
Siemens f. Studio
Paris, France
Siemens f. Studio,
Stuttgart, W. Germany
Süddeutsche Klischee-U.
Munich, W. Germany
Tesse
Brussels, Belgium
TGI
Glanerbrug, Netherlands
Time Scan
Leinfelden, W. Germany
Vau Velle Photo Litho
Leeds, England
Wirth f. Studio
Frankfurt, W. Germany
WWS Repro
Ditzingen, W. Germany
Zeno GmbH
Münster
Zilling f. Studio
Neuss, W. Germany
Zuliani S. A.
Montreux, Switzerland

In Asia, Australia, and Africa there are these installations:

Curman
Sydney, Australia
Hirt & Carter
Capetown, South Africa
Kaigai f. Studio
Tokyo, Japan
Koei Insatsu
Japan
Mika Seihan
Tokyo, Japan
Photra f. Studio
Johannesburg, South Africa
Scanagraphix
Melbourne, Australia
Senmeisha
Tokyo, Japan
Show Ads
Melbourne, Australia
Siemens f. Studio
Melbourne, Australia

separation services is about $3 million and that the on-going costs of the Chromacom system will be $1.2–$1.5 million per year. Boynton mentioned as important in keeping costs down the need for a single decision-maker for approval purposes. If several people are involved in the approval process, it may take many proof cycles to please them all. That would eat up most of the savings.

Sirota emphasized that Kwik had had to go through a learning process before it learned how best to make the system pay for itself. He pointed out that the learning process involved not just the system operators, but also the sales force and the company management. To make money with the Chromacom, Sirota says, "management has to know as much as the operator." Cost estimating for the system is a key area where this is true. While Kwik's sales force can make estimates for conventional jobs, all estimating for the Chromacom is still done centrally. Training the sales force on all the ins and outs of the Chromacom would simply be too hard, and there are no easy rules of thumb.

Sirota's shop is set up to make just about any type of proof a customer might want including press proofs. Boynton is standardizing on Chromalin proofs. Both men emphasized the variable nature of the printing process as limiting the value of proofs. Sirota said he had once sent out the same set of separations to five different printers, all of them highly regarded and all equipped with the proper densitometric equipment to presumably match specifications exactly. The results were surprisingly non-uniform. Boynton suggested that proofing technology was forcing printers to do a better job. He said that prior to the widespread use of proofs for on-press quality control, printers weren't required to meet objective standards. The implication was that Chromalins and similar proofs, properly made, constitute a more reliable basis for judging an image than press proofs, which may actually be less dependable in representing the final printed piece.

Operator qualifications. One of the areas of divergent opinion between Boynton and Sirota was the suitable background for potential Combiskop operators. Boynton downplayed the need for prior graphic arts experience. He said that a sense of humor was the key requirement—learning new skills and breaking in new equipment is always a trying experience and a sense of humor in important in dealing with it. Boynton's second consideration was intelligence, with graphic arts experience ranking a distant third. Boynton means what he says: one of his Combiskop operators had been a typist prior to the purchase of the system.

Boynton does not see the Combiskop as a place where color adjustments should be made (a fact that helps to explain why he feels graphic arts experience is not too important). If the scanner is set up correctly, he expects that an image can be passed through the page-assembly process and output without correction. If the proof shows a need for color adjustment, then the image can be brought back up on the Combiskop and adjusted as specified from the proof. Boynton feels that primary responsibility for color control should rest with the input scanner operator (who, Boynton feels, *must* have color separation experience) and with the quality control department.

Dan Sirota also stresses intelligence as a key trait for Combiskop operators, but he believes that a thorough grounding in graphic arts practice and the underlying theory are very important. As a result, the operators at Kwik have solid backgrounds in conventional color work.

Both Sirota and Boynton see the technology of the Chromacom system opening up new areas of endeavor. Boynton stresses cost savings. Shorter print runs will be possible because pre-press investment can be recovered on a smaller sales volume. He sees that Time-Life will be able to offer books tailored to smaller audiences. As a facetious example, he suggests the title "Plumbing for the Left-Handed."

Use for designers. Sirota emphasizes the new creative possibilities. There are many things that the Chromacom can do which would be impossible or prohibitively expensive using conventional techniques. He sees signs that ad agency art directors are beginning to plan jobs with such possibilities in mind. Some art directors who want to use the capabilities today are holding back, Sirota says. They want to have other shops to fall back on in case Kwik's system is down or overbooked when they need a job produced. Sirota is not too chagrinned at the prospect of other systems being installed in New York, since those installations mean that more art directors will feel easy about planning jobs that involve the system.

Sirota foresees a day when designers will be able to work on a system of this type. He relates the story of a clothing designer who came into the Kwik facility to check on an ad. Intrigued by the Combiskop, he asked for several changes to be made to the suit that was pictured on the display: the color was changed, the lapels were made narrower, the vest eliminated, the shoulders rounded, etc. Finally, satisfied, he announced that he was going to go back to his shop and create the suit he had just seen on the monitor.

Economics: cost-justifying the system

There seem to be two major applications for the Chromacom system. It can be viewed primarily as a way of automating conventional stripping, or it can be viewed as a device for special effects which are difficult to obtain by other methods.

If it is viewed primarily as a stripping tool, then the way to cost-justify the system is to push as many pages as possible through the system. In this case, it is important *not* to spend too much time on retouching, color spotting, and other niceties. With all the facilities that the system puts at the operator's disposal, it is tempting to fix up problems that would not be corrected in conventional processing. But unless such work has been allowed for in pricing the job, time spent on such activities is non-revenue-producing time.

This approach to using the system has several advantages. Jobs can be estimated and thought of by the customer and the sales force as if they were to be handled conventionally. There would be relatively little retraining involved in those areas. The sales effort could emphasize jobs with lots of pages, to keep the Chromacom system busy. Many successful Chromacom users have taken this approach.

Here is how the cost-justification might be achieved, using figures provided by HCM. Suppose a shop with a Chromacom could produce 300 pages per month at a selling price of $500 per page. This could be done with two shifts, according to HCM, providing the work is not primarily ads.

Revenues would be $150,000 per month. Against this figure must be balanced the costs. Labor would be roughly

$20,000 per month. The interest on a seven-year loan which paid for the Chromacom would also be about $20,000, and payments of principle would be another $24,000. There would be roughly $6,000 per month for the service contract. Beyond these items, which total about $70,000 per month, there would be materials, sales costs and various overheads, but it is evident that the payback could be quite attractive if these figures are realistic.

An alternative approach to using the Chromacom, and one that makes use of the real power of the system, is to concentrate on work that is difficult by conventional processes but easy on the Chromacom. In this approach, the sales force has to be taught the special advantages of the system for various types of work, and they have to seek out those jobs which are most appropriate. These will often be ads, with relatively few pages but a high price per page. Job estimating is of critical importance, since if the time required on the system is badly underestimated the job is unprofitable, and if it is badly overestimated the job may be lost to a shop using conventional processes.

The special needs of gravure

Gravure printing is a very specialized field. It is noted for its ability to produce high-quality color work without the consistency problems of offset. It is a very attractive approach to printing, except for the difficulty of the pre-press phase.

Gravure costs are dominated by the cost of preparing the huge, ungainly printing cylinders. The cost is so great that only very long press runs can be considered. Runs in the millions of impressions are common, and jobs must generally be at least in the hundreds of thousands to be economically produced by gravure. General-circulation magazines, direct-mail pieces, and Sunday newspaper magazine sections are examples of work which is often done by gravure.

Hell has been in the forefront of automating the production of gravure cylinders. The Hell Helio-Klischograph is a computer-controlled multi-headed engraving machine which engraves cells into copper-coated gravure cylinders with diamond styli. It has been widely accepted by gravure printers. Its only significant competition is the laser-engraved plastic-coated gravure cylinder developed by Crosfield. The first installation of that system is at Sun Printers in England.

Hell recently made public research work on a new engraving process which may form the basis for Hell's gravure products five or six years from now. The new method involves engraving a conventional copper cylinder with an electron beam. This exotic process must be performed in a total vacuum. The process promises two key advantages over present engraving methods: it will be an order of magnitude faster, and it will produce better-quality type and line art.

The latter advantage is due to the fact that with the electron beam, cells need not be placed precisely in a straight line (as they are with the Helio-Klischograph). The electron beam is readily deflected a small amount to either side to accommodate the needs of line art, whereas with the Helio-Klischograph, line art has to be fit to the machine's rigid raster causing the type and line art to have a slightly ragged look.

The benefits of this new technology, if it can be brought to market, will make gravure much more competitive than it is today in terms of smaller print runs and high-quality line art to match the quality of the process color.

Plans for the Future

The following statements, provided to us by HCM for this article, describe the approach Hell/HCM intends to take in developing two new capabilities: merging typeset text with graphics, and providing a pre-Combiskop page-composition station.

Text and graphics. The DC 350S and CP 340S are currently able to scan text (or any line art) in a special high-resolution mode (six times normal). The type or line art thus scanned is then merged with the Combiskop-created geometric figures and both are processed internally at this high resolution. For users with high-volume type requirements, we will soon have a special Raster Image Processor (RIP) that will output type face image data in the standard Chromacom raster format. We will be able to interface this RIP to any front-end system, and we are making arrangements with major American vendors of digital font libraries to license their fonts to our customers. We are planning to have this product available by the middle of next year.

Pre-Combiskop station (Designer station). We are developing an extended version of the Layout Programmer Station that will be able to handle full-color images as well as geometric figures and frames. This station will work with a library of video-format pictures that have been input through a standard television camera, and the originals of the selected pictures will then be scanned in at the regular scanner. The initial hard-copy output at this station will be a monochrome representation of the composed page, which can then be used as proof-copy for approval by an art director or as a layout by the Combiskop operator. Ultimately, this station will have multiplexing and networking capabilities with the Combiskop, the Scan/Reco station, the type RIP, and with others of its own kind. We plan to release more information on this product next year.

Conclusions

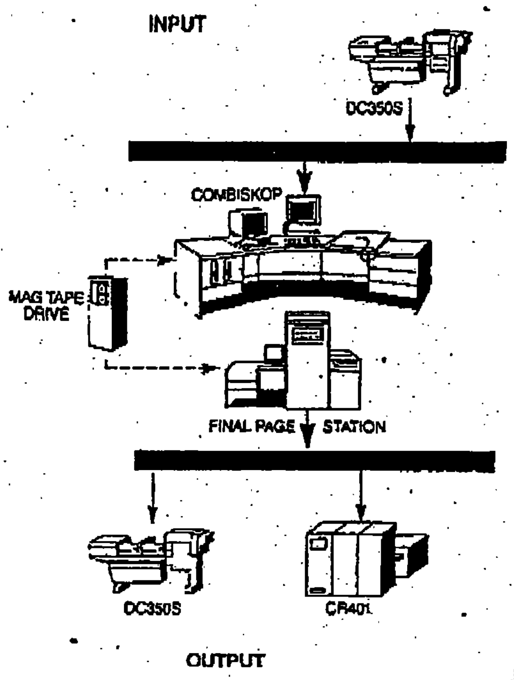
The Chromacom has, by now, proved itself a worthy contender in the color page-assembly arena. Chromacom sales are going very well at the moment (at the same time that Scitex has experienced several quarters of flat sales) and the future looks promising.

With the exception of real-time image rotation and sizing, all the basic tools are in place for efficient production, and the plans for future offerings sound appealing. We think the decision to interface to various front ends and to use fonts from various sources (instead of relying entirely on the Hell Digiset fonts, which Hell must have been sorely tempted to do) is a very good one. This will make the Chromacom attractive to a new and extensive market: potential customers with an existing investment in editing and typesetting equipment and a need for color page-assembly.

We are also attracted to the idea of the video-resolution pre-Combiskop station that Hell plans to offer. In some respects, this product sounds similar to the Scitex "Vista" console, introduced at DRUPA. But we like the Hell approach of working with full-color imagery from a television camera. This type of product could be the forerunner of workstations

Pricing

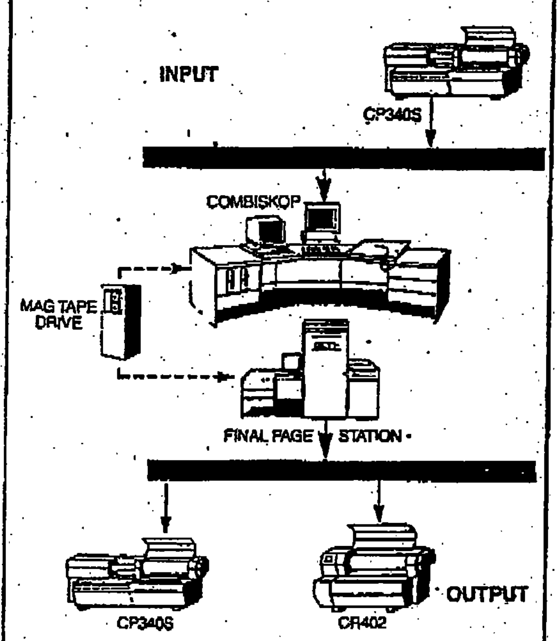
HCM provided the following pricing for two sample configurations.



Price summary: Configuration No. 1[1]

One DC350 L/S scan/record station	$475,500
One page make-up station	426,200
One page processing station	159,700
Subtotal	$1,061,400
One 401 recorder	$252,500
One layout programmer	68,750
Total price	$1,382,650

[1] Prices for both configurations include software.



Price summary: Configuration No. 2[1]

(1) CP 340 L/S Scan/Record Station	$549,500
(1) Page Make-Up Station	426,200
(1) Final Page Processing (Includes 1 Magnetic Tape Drive)	159,700
(4) Additional 300 Mbyte Disk Drives	76,600
Total Price	$1,212,000

Additional options include:

Proof recorder		$296,200
402		257,000
Output recorder:		
Network level I	avail. 1/Q '83	32,500
Network level II	avail. 2/3 Q '83	47,600
Network level III	avail. '84	not avail.

which are design tools, rather than production ones. Just as the newsroom terminal changed the typesetting world, bringing control into the hands of the author/editor and making production more efficient, so a design workstation could change the world of color pre-press, bringing the same kinds of control and efficiency.

In the nature of these new offerings (as well as in the willingness to announce them while they are still under development) we see signs of increasing responsiveness of Hell to the North American market. This we applaud. Hell has, at times in the past, has appeared to us unresponsive to (or unconcerned with) the particular requirements of potential customers on this side of the Atlantic, but this appears to be changing.

Hell's unique position as a vendor of both typesetting and color page-assembly systems means that as these areas merge, Hell is very well positioned to maintain a leadership role. Of the various technologies involved in getting straight to the printing plate from raw inputs, the only one Hell has no announced product for is the ability to make lithographic plates directly from Chromacom output. But Hell has shown products pointing in this direction in the context of its newspaper facsimile work, and we would expect this last capability to be added in due course.

Hell has a lot of strengths. If the company continues to listen to the needs of its customers, especially when it comes to the American market where much of the action will certainly be in the near future, it should continue to prosper. HCM is making important contributions in product definition and refinement and we expect HCM will be able to play an increasingly important role in Hell's future offerings.

George A. Alexander